

**HOW TO ADDRESS UNUSED MEDICINE DISPOSAL
IN NEW HAMPSHIRE**

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1.0 INTRODUCTION

The occurrence of pharmaceuticals in surface and groundwater is becoming recognized as a concern. One pathway for pharmaceuticals entering water resources is via the manner in which people dispose of unused medicines.

Developing medicine disposal practices that are legally and environmentally sound, and that prevent accidental drug poisonings or intentional drug abuse require the consideration of many issues and coordination of multiple stakeholders. The objective of this document is to establish background information on medicine disposal in New Hampshire that can be used by stakeholders to develop a statewide policy on proper medicine disposal practices.

2.0 MEDICINE USE TRENDS

With advances in medical technology and increases in healthcare marketing and spending, the consumption and uses of medicine have been consistently rising. In 1999-2000, 44 percent of Americans took at least one prescription drug, and 17 percent took at least three prescription drugsⁱ. These statistics were up from an average use of 39 percent and 12 percent respectively, between 1984 and 1994. According to the New Hampshire Board of Pharmacy, two out of every three patients that visit a doctor leave with a prescription. In 2006, 15 million prescriptions were filled in New Hampshireⁱⁱ. In the United States, sales of over-the-counter medicines have increased by 60 percent since the 1990sⁱⁱⁱ. The US Census Bureau estimates the proportion of the population in the US that is older than 65 years is projected to increase from 12.4 percent in 2000 to 19.6 percent in 2030. Older people tend to take more drugs than younger people because they are more likely to have chronic disorders. For example, the prevalence of diabetes, hypertension, and heart disease increase with age.^{iv} Based on current trends in medicine use and population age, it is apparent that overall medicine use in the United States and New Hampshire will increase over time.

The increased use of medicines raises concerns about the fate and transport of used and unused medicines in the environment and their impact on human and ecological health. Medicines stored in the home also present the potential for poisoning or abuse. Some statistics associated with drug abuse and poisonings include^v:

- Most nonfatal, poison-related suicide attempts involved prescription medicines.
- The number of Americans who abuse controlled prescription drugs has nearly doubled from 7.8 million in 1992 to 15.1 million in 2003.
- Prescription medicine abuse among teens has more than tripled during that time.
- In 2006, abuse of prescription pain medicines ranked second—only behind marijuana as the nation's most prevalent illegal drug problem. Much of this abuse appears to be fueled by the relative ease of access to prescription medicines.
- Drug deaths in New Hampshire have increased by 350% over the last 10 years (see Figures 1 and 2)^{vi}
- There is no jurisdiction of 1,000,000 or more people where drug deaths exceed traffic deaths^{vii}

Figure 1: NH Drug Deaths 1995-2007

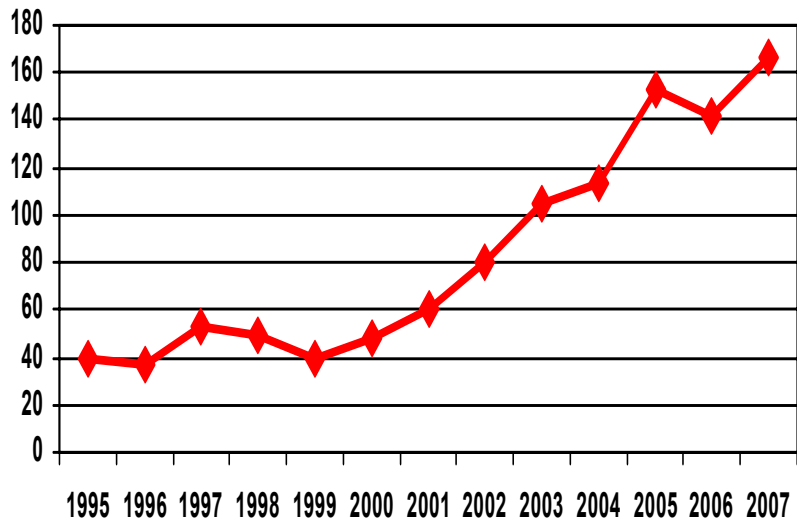
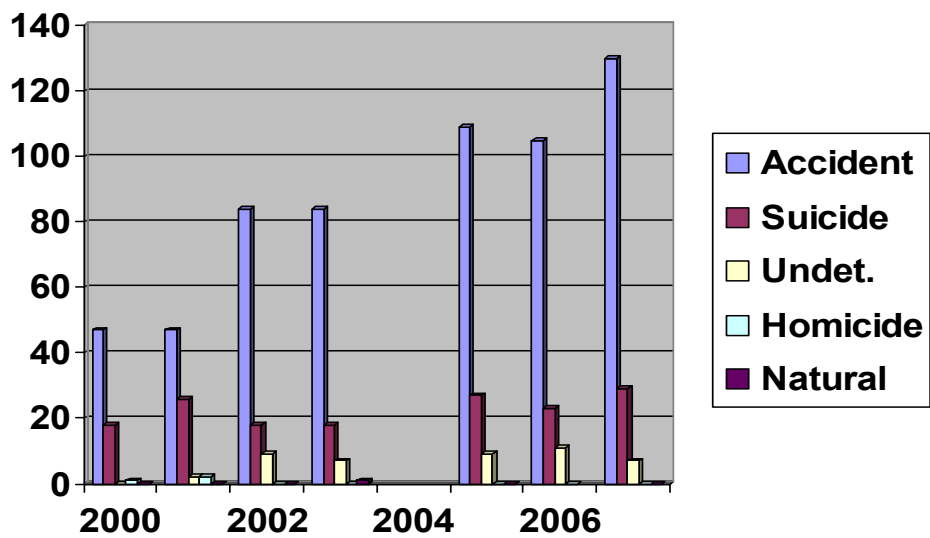


Figure 2: Drug Deaths 2000-2007 by Manner



3.0 LEGAL ISSUES AFFECTING MEDICINE DISPOSAL

3.1 Federal Regulation of Controlled Medicines

The federal Controlled Substances Act is the legal basis by which the manufacture, importation, possession and distribution of certain drugs are regulated. The act provides the USDEA with the legal authority to regulate the management and collection of medications that are considered to be "controlled substances." Controlled substances are all drugs that either depress or stimulate the central nervous system, and thus have the potential to be abused. Examples of controlled substances include Valium, Oxycontin, Percocet, and Codeine.

Pharmacists may dispense controlled substances to people with prescriptions. The USDEA prohibits the transfer of dispensed controlled substances from an individual back to a doctor, pharmacist or reverse distributor (companies that take unused or expired drugs back from a pharmacy), except in the case of a recall or a dispensing error. Law enforcement officials are specifically authorized by USDEA laws and regulations to receive and possess controlled substances. Therefore, only the person to whom a controlled substance has been dispensed may legally be in possession of it. The sole exception is that controlled substances may pass into the custody of law enforcement officials as USDEA laws and regulations authorize them to receive and possess controlled substances. USDEA laws and regulations have forced home health and hospice care workers to dispose of unused medicines immediately after the death of the patient. After a patient is deceased, it is unlawful for a health care worker or any person other than a law enforcement officer to take possession of controlled substances and properly dispose of them.

When a pharmacist no longer wants to store unused controlled substances or these medicines expire, pharmacists may contract with a reverse distributor registered with the USDEA to dispose of the controlled medicine or dispose of the substances on-site under the supervision of a representative from the Board of Pharmacy.

3.2 Federal and State Hazardous Waste Laws

The US Resource Conservation and Recovery Act and the New Hampshire Hazardous Waste Rules regulate the transportation, treatment, and disposal of hazardous waste, but exempts waste generated by households. Some prescribed and over-the-counter medicine products become hazardous waste when discarded by some entity other than the individual user if they are listed hazardous wastes or exhibit one of the four characteristics defined in Env-Hw 400, ignitability, corrosivity, reactivity or toxicity. For example, NicoDerm patches, Epinephrine, Coumadin, Leukeran, lindane, and Alkeran are listed hazardous wastes. Several unused medicines that are considered hazardous waste are ignitable because of the alcohol content or toxic due to heavy metals such as mercury. Commonly used medicines considered to be hazardous waste may be found in attachment A.

As part of unused medicine collection pilot projects organized by the Northeast Recycling Council (NERC), a list of the medications collected was examined to determine which materials collected should be considered as hazardous waste. This study estimated that approximately 10 percent of the over-the-counter and prescription medications collected (by type not by volume) were considered hazardous waste^{viii}.

Federal and state hazardous waste legal requirements affect collection and disposal requirements for unused medicines. Medicines are exempt from federal and state hazardous waste regulations when in use, in storage, or disposed of by a household; when medicines are disposed of by a pharmacy, hospital or other facility, hazardous waste regulations do apply. Unused medicines in a household may legally be disposed of through a wastewater system or as residential solid waste without being subject to any hazardous waste regulations. However, if unused residential medicines are collected at a central location, and medicines considered to be hazardous are included within the collection, both the facility collecting the unused medicines and the disposal of the medicines are subject to hazardous waste regulations. A pharmacist may segregate hazardous waste medicines from non-hazardous medicines. If this occurs, the disposal of non-hazardous waste medicines may occur at a municipal incinerator where these medicines would be considered municipal waste. Medicines considered to be hazardous waste would have to be transported by a licensed hazardous waste hauler and disposed of at a hazardous waste disposal facility.

3.3 State Board of Pharmacy Requirements

The state Board of Pharmacy regulates pharmacies and pharmacists. The board prescribes specific practices for accounting for prescription medicines and documenting their disposal. The board has established regulations that ensure unused medicines from pharmacies are returned to reverse distributors or are physically destroyed. This may include flushing into a wastewater system or disposal as solid waste after rendering the medicine unusable. A pharmaceutical board representative has explained that most pharmacies utilize reverse distributors to dispose of unused medicines.

3.4 State Wastewater Disposal Regulations

Wastewater in New Hampshire is either disposed to a sewer system that is associated with publicly owned treatment works (POTW) or to groundwater onsite. Approximately 65 percent of households in the state discharge wastewater to the groundwater via septic systems or permitted large groundwater discharge sites. Approximately 35 percent of the householders in the state discharge to a sewer/POTW system. When a facility discharges waste to a POTW, these discharges must be approved by the Department of Environmental Services (DES) and the POTW. DES has established regulations for discharges to POTWs (see Env-Ws 904 Standards for Pretreatment of Industrial Wastewater). These regulations prohibit the discharge of hazardous waste and pharmaceutical waste to POTWs without a discharge permit from DES and approval from the POTW. No facility has requested permission from DES to discharge waste pharmaceuticals to a POTW. However, it is

suspected that many facilities dispose of unused medicines into wastewater systems as an efficient and certain means to ensure unused medicines are made unusable.

Facilities that discharge wastewater to groundwater on-site are not prohibited from disposing medicine into the wastewater stream at this time unless the medicine contains a regulated substance as defined by Env-Wq 401.03. DES is not aware of any analyses that assesses if substances regulated by New Hampshire or the federal government are contained within medicines. DES is aware that 1,4-dioxane is a regulated substance and is present in lotions, bubble bath, finger nail polish and shampoos. The ambient groundwater quality standard for 1,4-dioxane in New Hampshire is three parts-per-billion.

4.0 OCCURRENCE OF MEDICINE IN THE ENVIRONMENT

4.1 Detection in the Environment

The detection of trace levels of various medicines in groundwater and surface water in the United States is increasingly becoming an issue of concern. At this time, studies assessing the occurrence of medicine in surface water and groundwater in New Hampshire have not been published. It is anticipated that the United States Geological Survey will publish results of limited testing of New Hampshire drinking water supplies in 2009. Similarly, the United States Environmental Protection Agency (EPA) and DES collected river water and fish tissue samples at two sites in the Connecticut River (Hinsdale and Claremont) and two sites in the Merrimack River (Concord and Franklin). These samples will be analyzed for the presence of medicines and personal care products as part of EPA's "Flowing Waters" program. The results of the sampling program will likely not be published for 1-2 years.

Areas of the state where higher concentrations of medicines may be observed in surface water would generally be associated with wastewater treatment plants that discharge to rivers. Areas of the state where higher concentrations of medicines may be observed in groundwater would generally be associated with permitted wastewater-groundwater discharge sites (sites that discharge more than 20,000 gallons a day of domestic wastewater), areas with a high density of septic systems, and older landfills that are not lined and capped. There are several long-term health care facilities that utilize large septic systems or other onsite disposal technologies for wastewater disposal. This means all pharmaceuticals contained in excreted waste or unused medicines that are flushed at these facilities are initially discharged to a central subsurface location at these sites.

Research studies have found that endocrine functions of certain aquatic organisms have been adversely impacted by chronic exposure to trace levels of medicine in surface water. While no studies have associated trace levels of medicine in drinking water to adverse human health effects, research in this area is not robust. Overall, there is general concern that long-term exposure to low doses of individual or combinations of medicine could negatively impact human health.

4.2 Pathways Into the Environment

Medicines enter the environment after use and excretion by humans or animals; or by disposing of unused medicines as solid waste or into a wastewater disposal system, including sewer or on-site septic systems. There is insufficient information to determine the relative quantities of drugs reaching the environment from each of the various sources. Reducing the presence of pharmaceuticals in the environment would require changes in: 1) when and how medicine is prescribed and used; 2) how pharmaceuticals are designed and engineered so that they do not persist in the environment once released; and 3) how unused medicines are disposed of.

Policy makers and state agencies in New Hampshire can take measures to encourage initiatives at the national level to improve practices related to the design and use of pharmaceuticals. The state cannot affect changes in these areas alone, and ultimately must collaborate with other state and federal agencies, corporations, health care officials and policy makers to make improvements in these areas.

New Hampshire can implement initiatives to improve practices relating to how unused medicines are disposed of. Most health professionals and environmental researchers agree that the majority of pharmaceuticals detected in the environment are associated with the legal use and human or animal excretion of medicines and personal care products opposed to the method of disposal of unused medicines. However, the introduction of unused medicines into the environment is not a trivial environmental issue. For example, in Clark County, Nevada (adult population of 1.2 million), the coroners, when investigating a death, usually attempts to locate and dispose of onsite, any remaining prescribed medications from the deceased person. Based on a study of 13 months of records, it was determined that the coroner's office disposed of 325,000 doses of a wide array of drugs into the sewage system.

An analysis of a subset of the medicine disposal data shows that the method of medicine disposal important relative to environmental protection. During the 13 month study, there were 1,755 tablets of the anticonvulsant, carbamazepine (CBZ). CBZ is considered the primary drug for partial and tonic-clonic seizures and is also used in other treatments. The efficiency of wastewater treatment plants in removing this chemical from wastewater is not very high. Approximately 1-3 percent of CBZ is excreted unchanged. This means, the disposal of 1,755 tablets of CBZ to a sewer system is roughly equivalent to 51,000-154,000 oral doses (assuming 1 to 3 percent excretion rate and a typical does of 200 milligrams).^{ix}

There is insufficient data to demonstrate that any one method of residential medicine disposal is more protective of the environment than another. However, almost all experts representing diverse stakeholders agree that disposing of medicines directly to a wastewater system is the least desirable disposal method relative to water quality protection. While a majority of experts promote incineration for most types of unused medicines, others believe there is little difference in the amount of medicine that is discharged to the environment when comparing disposal by incineration to disposal in a modern capped and lined solid waste landfill (Tischler 2007)^x. Tischler has postulated that

up to 99 percent of the constituents in the medicines are not leached from waste in the landfill due to:

- Partitioning of the ingredients in the medicine to solids.
- Anaerobic degradation (breakdown by microbes and bacteria).
- Hydrolysis (chemical breakdown caused by a reaction with water).

Tischler calculated that if all unused drugs are discarded in a landfill, and it is assumed that all landfill leachate is captured and discharged to a publicly owned wastewater treatment facility, unused medicines would account for 0.9 percent of the medicine detected in treated wastewater. Ninety-nine percent of the medicine detected in the wastewater would be associated with waste from patients properly taking medicine. Tischler's work is entirely based on calculations. Actual data describing the amount of unused medicine in solid waste disposed of in the landfill versus the amount of medicine detected in the leachate derived from the landfill are not available.

5.0 CURRENT SOLID WASTE AND MEDICINE DISPOSAL PRACTICES IN NEW HAMPSHIRE

5.1 General Solid Waste Disposal Practices in New Hampshire

Approximately 85 percent of the solid waste in New Hampshire is disposed of in landfills, while the remaining 15 percent is incinerated. New Hampshire has two large municipal solid waste incinerators located in Claremont and Concord and five smaller solid waste incinerators in other municipalities.

If incineration is the preferred method for disposal of unused medicines, The DES Air Resources Division has confirmed that the two large municipal incinerators are viable options for disposal of the majority of residential medicines because these facilities are equipped with state of the art air pollution control devices. It should be noted that the World Health Organization considers incineration the best way to dispose of pharmaceutical waste.

Medicines not classified as hazardous waste and centrally collected may be considered municipal waste and incineration would be allowed. However, there is no program or process in the state in which unused medicines can be transferred from their owners (individual consumer, pharmacists or health care providers) to an appropriate incinerator. Historically, hospitals owned and operated incinerators, however there are no permitted incinerators at hospitals in New Hampshire at this time and as of January 1, 2014 medical waste incineration will be banned in the state.

5.2 Medicine Disposal Practices in New Hampshire

New Hampshire consumers, health care facilities and pharmacists all have approaches for disposing unwanted or expired medicines. The typical disposal options and practices for these entities are described below.

5.2.1 Consumers

Currently, no state or federal law or regulation stipulates how consumers dispose of unused medicines. The most common disposal option for unwanted medicines in New Hampshire is to: 1) dispose as solid waste; or 2) dispose in a sink or toilet. A study in the eastern US estimated that individuals in residential settings generate 66 percent of all unused medicines. The study estimated that 54 percent of the unused medicines possessed by these individuals are disposed of as solid waste and 35 percent are disposed of in a wastewater system^{xi}.

5.2.2 Pharmacists and Reverse Distributors

Pharmacists can dispose of unused controlled medicines via the use of reverse distributors unless the medicines are hazardous waste. Reverse distributors accepting controlled substances must be registered with the USDEA. On-site disposal of controlled substances to wastewater system under the supervision of the Board of Pharmacy is also permissible if the requirements for wastewater disposal described in Section 3.4 are complied with. However, it is not a common practice for pharmacists to dispose of medicine into a wastewater system.

Unused uncontrolled medicines are typically also returned to distributors. However, laws and regulations do not prohibit the disposal of these medicines as solid waste, unless the unused medicine is considered a hazardous waste. Additionally, laws and regulations do not prohibit the disposal of unused medicines to an onsite wastewater disposal system unless the medicine contains a regulated substance. Typically reverse distributors sort unwanted pharmaceuticals for proper return or disposal. Some collected pharmaceuticals are returned to manufacturers who often provide credits for the returned products. Those unable to be returned to the manufacturer are sent for off-site disposal by the reverse distributor generally by incineration. There are no reverse distributors that are based in New Hampshire.

Reverse distributors cannot accept pharmaceuticals that have been prescribed and given to patients. Once outside the control of the pharmacy, concerns for a pharmaceutical's purity and safety eliminates its value as a potential product.

5.2.3 Health Care Facilities

Health care facilities typically receive medicines that have been delivered from a pharmacy. When the healthcare facility receives the medicine from the pharmacy, the medicine is considered to be dispensed. These medicines are centrally stored at a facility in a secure and climate-controlled environment. Health care professionals access the medicine when it is time to administer individual doses to the patient. A study of medicine disposal practices in the eastern United States found that health care facilities typically dispose of all unused controlled and uncontrolled medicines into a wastewater system^{xii}. A study in the Eastern US estimated that long-term health care facilities generate 34 percent of unused medicines.

The Board of Pharmacy is developing a pilot project to redistribute some of the most frequently prescribed medicines that are not considered controlled substances rather than discarding to waste at long-term health care facilities. The pilot project would be applicable only when dispensed unused medicines have been stored in a secure and climate controlled environment at a health care facility. The pilot project was a result of a law passed in 2006 (House Bill 1681) that amended RSA 318 to require the board to establish a redistribution program for non-controlled medicines.

A representative of the board explained that the success of the medicine redistribution program may be limited, as HB 1681 only provides legal immunity for the manufacturers of the medicines. Pharmacies will likely be hesitant to participate in a medicine redispensing program because of the legal liability associated with obtaining and redispensing previously dispensed medications. Legislation may be proposed in New Hampshire in 2009 to amend state law to provide immunity for pharmacies that participate in redistribution programs.

6.0 UNUSED MEDICINE MANAGEMENT OPTIONS

Eight potential options for managing unused medicines are described in this section. For each of the take-back options listed below, there will be costs associated with implementing an education and outreach program and in disposing of the medicine. Also, adopting and implementing any of the options will require coordination with the State Board of Pharmacy, USDEA, Department of Health and Human Services, Department of Safety, Northern New England Poison Center, long-term health care facilities and other interested stakeholders.

Some pharmaceutical companies have a corporate policy to work with government entities where unused medicine management programs are implemented. New Hampshire should seek the assistance of pharmaceutical companies as it implements approaches for managing unused medicines.

The primary issues that need to be addressed while determining a proper disposal method for unused medicines include:

- Developing a program that is readily accessible to consumers throughout the state.
- Developing a program that allows for immediate disposal of unused medicines in residential settings to reduce the risk of drug abuse or accidental poisoning.
- Ensuring the security of collection sites.
- Ensuring security of medicines from the point of collection to the point of destruction.
- Developing an array of options that can be collectively used to dispose of medicines at hospice sites and long-term health care facilities.
- Identifying sustainable funding methodologies implement proper disposal practices.

Each option is assessed below.

1) Maintain Current Unused Medicine Practices and Conduct Additional Research

As described in Section 5, the primary entities disposing of unused medicine in New Hampshire are individual consumers and long-term healthcare facilities. Based on a national study of the unused medicine disposal practices previously discussed in Section 5, approximately 35 percent of the unused medicines are disposed of in a wastewater system and 54 percent of the unused medicine is disposed of as solid waste. The remaining 16 percent of unused medicines may be stored, illicitly given to another person or is otherwise unaccounted for.

Research has not been completed describing the occurrence of medicines in the state's water resources. However, most experts knowledgeable about the fate and transport of medicine in the environment agree that discharging unused medicines to surface water and groundwater is not an acceptable disposal practice. Most experts also agree that for most unused medicines, incineration is an appropriate disposal practice. There is disagreement over the fate and transport of unused medicines discharged in landfills. Some experts have estimated that unused medicines do not significantly contaminate leachate emanating from a modern capped and lined landfill. These assessments describe processes that contribute to the breakdown or retention of the medicines within a landfill. Other experts believe that unused medicines disposed of in landfills ultimately would contaminate leachate and impact groundwater or surface water. DES could work with other organizations to further assess the fate and transport of pharmaceuticals disposed of in landfills. Funding for this type of initiative would have to be obtained.

2) Develop a "Do Not Flush" Educational and Outreach Program and Develop Guidance Documents for Long-Term Health Care Facilities to Manage Unused Drugs as Solid or Hazardous Waste.

Based on data obtained from studies assessing medicine disposal practices in the eastern United States, approximately 35 percent of the unused medicines are flushed to sewer or onsite wastewater systems. It is estimated that 60 percent of the medicines disposed to wastewater systems are from long-term health care facilities and that 40 percent are from individual consumers. The typical medicine disposal practice at long-term health care facilities is flushing the medicine into a wastewater system.

An outreach program could be developed by working with pharmacies, doctors, other government agencies and long-term health care facilities. The program could stress the importance of keeping medicines out of the state's water resources, and provide information about proper disposal practices. This option would represent a request for minor behavioral changes and directly result in a reduction of residential medicines that are released to the environment. The most difficult aspect of this option is ensuring disposal methods and materials can be easily developed to make certain discarded medicines do not result in drug abuse or poisoning. To that end, DES could work with stakeholders to identify or develop options for safely disposing of unused medicine as solid waste. This management option will result in more unused medicines being disposed of as solid waste, of which 85 percent would go to landfills and 15 percent would be incinerated. As described in Section 4.0, it would be important to verify that medicines disposed of in capped and lined landfills are in fact either retained in the landfill or degrade into constituents that are harmless when released to the groundwater or surface water.

This option would require that the USDEA issue a waiver from or amend its regulations. Long term health care facilities and other entities administering the day-to-day health care of another individual must flush unused medicines into the wastewater system at a given facility or location of a patient.

This option, however, probably would not require that USDEA issue a waiver from or amend its regulations relative to residential medicine disposal. This is because the method of disposal of controlled medicine in a residential setting is not specifically regulated by USDEA other than that controlled substances cannot be used by persons or uses other than prescribed.

3) Establish Periodic Community Collection Programs

Periodic collection days for unused medicines could be implemented. These events could occur on their own, at pharmacies, at household hazardous waste collection days, or at blood drives. The events could be organized by government agencies or other organizations. NERC conducted several unused medicine collection days throughout New England. From these experiences, NERC developed a guidance document describing all of the legal and logistical issues that need to be addressed when developing a medicine collection day event.

Periodic community collection programs are more complicated than conducting a hazardous waste collection program. A pharmacist, law enforcement officer and qualified hazardous waste professional need to be present during the collection program. The law enforcement officer must take all controlled substances directly to the incineration disposal facility and witness their destruction.

Periodic community collection programs may send an inconsistent message to the community about proper behavior regarding storage and disposal, and may not reduce home poisoning or prescription drug abuse incidents as it would require longer term storage of unused medications in the home. Additionally, it is difficult to create lasting, beneficial behavior change in a population that lacks on-going access to services. Finally, periodic community collection programs are considered by many to be inconvenient and this reduces overall participation in the program.

In summary, a community unused medicine collection program would provide a viable alternative for the safe collection and disposal of unused medicines. These events, however, are logistically and legally complicated and would only capture a fraction of unused medicines and are not likely to reduce the amount of medicine that is released to the environment in a measurable way.

4) Law Enforcement Office Collection Programs

Unused medicine collection boxes could be established in state, county or municipal offices that are continuously staffed by law enforcement officers. An advantage to this collection method is that permanent collection facilities with excellent security would be established. Disadvantages of this collection approach include: 1) the general public may find these collection sites inconvenient or intimidating; 2) these types of collection boxes may collect items other than unused residential medicines such as needles and syringes; and 3) The law enforcement offices would become hazardous waste generators subject to hazardous waste regulations. While it may be advantageous to remove these items from circulation, disposal of the contents of the collection box will provide additional risks and challenges for law enforcement officers, pharmacists and hazardous waste management companies.

5) Pharmacy Take Back Requirements

Requirements could be established that mandate pharmacies to take back unused medicines for proper disposal. A pharmacy take-back requirement would be convenient for consumers and has proven to be successful in other countries. USDEA's current regulations would not permit pharmacies to take-back medicines labeled as controlled substances. Pharmacies would become hazardous waste generators subject to hazardous waste regulations. Based on their training, pharmacy staff would be better able to differentiate between hazardous and non hazardous waste. Developing take-back requirements would place a financial burden on pharmacies, which are not responsible for the manufacturing, prescribing or actual use of the medicine. A mandatory pharmacy take-back program may be more appropriately initiated by the federal government so that overriding laws affecting controlled substance may be modified and allow retail pharmacies to develop national approaches to finance and implement medicine take-back programs.

6) Redispensing Medicine Programs

Redispensing medicine programs are currently being piloted in New Hampshire. This effort was described in Section 5.2.3. Unless legislation is passed that provides immunity to pharmacists participating in redispensing programs, this approach will not likely be viable or effective in reducing the volume of unused medicine that is disposed of. Additionally, other pilot redispensing programs conducted in other states have demonstrated that there is an ongoing problem of having a mismatch of medicines needed to medicines available for redispensing^{xiii}. Redispensing controlled medicines is not permissible under current USDEA regulations.

Costs specifically associated with this option include the additional time of a pharmacist to collect, document and redispense medicines. Additional liability insurance may also be a cost associated with a redispensing program.

7) Mail-In Programs

A mail-back program for unused medicine could be implemented. Mailers could be provided at pharmacies and unused medicines mailed to a USDEA office located in the state. Currently, the state of Maine is piloting such a program with a grant obtained from the United States Environmental Protection Agency. Mail back envelopes are distributed at pharmacies and unused medicines are sent from the consumer to MEDEA. Maine has established agreements with the US Postal Service and the Maine Drug Enforcement Agency (MEDEA) that allows consumers to return controlled and uncontrolled medicines to MEDEA's offices. USDEA has stated that it supports Maine's pilot take-back program.

As this program is just being implemented, a cost/benefit analysis cannot be completed. Costs specifically unique for this take-back option include purchasing mailers and the cost of postage.

8) Wastewater Disposal Prohibitions

As described in Section 3.4, state regulations prohibit the disposal of unused medicines and hazardous waste from facilities into a POTW. Although these regulations exist, facilities may not be aware of this prohibition. The regulation does not pertain to household disposal of unused medicines to POTWs. Also, state regulation generally does not prohibit facilities from disposing unused medicines to on-site wastewater systems that discharge to the groundwater unless the medicine contains a regulated substance.

New Hampshire could consider prohibiting disposing unused medicines at facilities with large wastewater groundwater discharges (more than 20,000 gallons/day) that require a groundwater discharge permit from DES. Additionally, DES could implement an outreach and, if necessary, an enforcement program for facilities that discharge unused medicines to POTWs. If technical data becomes available identifying certain medicines in surface water or groundwater as being hazard to ecological receptors or humans, DES will be required by state law to adopt appropriate surface water quality and groundwater quality health standards. However, these standards will be in conflict with regulations of the USDEA which require that long-term health care facilities flush all unused controlled substances into the wastewater system of the facility.

ATTACHMENT A

Hazardous Waste Pharmaceuticals

Potential Hazardous Wastes:

P-Listed Pharmaceuticals

Chemical Name	RCRA Waste #
Arsenic trioxide	P012
Epinephrine	P042
Nicotine	P075
Nitroglycerin	P081
Physostigmine	P204
Physostigmine salicylate	P188
Warfarin >0.3%	P001

U-Listed Pharmaceuticals

Chemical Name	Waste #
Chloral Hydrate (CIV)2	U034
Chlorambucil (chemo)	U035
Chloroform	U044
Cyclophosphamide (chemo)	U058
Daunomycin (chemo)	U059
Dichlorodifluoromethane	U075
Diethylstilbestrol	U089
Formaldehyde	U122
Hexachlorophene	U132
Lindane	U129
Melphalan (chemo)	U150
Mercury	U151

Warfarin <0.3%	U248
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Chemical Name	Waste #
Mitomycin C (chemo)	U010
Paraldehyde (CIV)	U182
Phenacetin	U187
Phenol	U188
Reserpine	U200
Resorcinol	U201
Saccharin	U202
Selenium sulfide	U205
Streptozotocin (chemo)	U206
Trichloromonofluoromethane	U121
Uracil mustard (chemo)	U237

Pharmaceuticals- Potential Toxicity Characteristic Contaminants

Chemical Name	RCRA Waste #	Concentration mg/L
Arsenic	D004	5.0
Barium	D005	100.0
Cadmium	D006	1.0
Chloroform	D022	6.0
Chromium	D007	5.0
M-Cresol	D024	200.0
Lindane	D013	0.4
Mercury	D009	.2
Selenium	D010	1.0
Silver	D011	5.0

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- ⁱ Khetan, S; and Collins, Terrance Human Pharmaceuticals in the Aquatic Environment: A Challenge to Green Chemistry, American Chemical Society, 2007
 - ⁱⁱ Written Communication from Paul Boisseau of the New Hampshire Board of Pharmacy.
 - ⁱⁱⁱ Ann Pistell, Maine Department of Environmental Protection. Presentation at Northeast Water Science Forum, August 9, 2007.
 - ^{iv} Khetan, S; and Collins, Terrance Human Pharmaceuticals in the Aquatic Environment: A Challenge to Green Chemistry, American Chemical Society, 2007
 - ^v Washington State Department of Ecology, Disposal of Medications from Residential Consumers Issues, barriers, and opportunities, 2007
 - ^{vi} Dr. Andrews, Chief Medical Examiner for NH, 2007 PowerPoint presentation
 - ^{vii} Dr. Andrews, Chief Medical Examiner for NH, 2007 PowerPoint presentation
 - ^{viii} Northeast Recycling Center, Operating Unwanted Medication Collections - A Legal and Safe Approach, 2006
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 - ^x Tischler/Kocurek, Potential Contribution of Unused Medicines to Environmental Concentrations of Pharmaceuticals, A report prepared for Pharmaceutical Research and Manufacturers of America, 2007
 - ^{xi} Washington State Department of Ecology, Disposal of Medications from Residential Consumers Issues, barriers, and opportunities, 2007
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 - ^{xiii} Kallaos, Pharmaceuticals in Wastewater Streams: Disposal Practices and Policy Options in Santa Barbara, A Master's Project for the Donald Bren School of Environmental Science and Management, 2007